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08/916,629	08/22/1997	CHAD A. COBBLEY	97-0098	3496

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EXAMINER

AFTERGUT, JEFF H

ART UNIT

PAPER NUMBER

1733

DATE MAILED: 05/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

08/916,629

Applicant(s)

COBBLEY ET AL...

Examiner

Jeff H. Aftergut

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 March 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-22 and 40-44 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-22 and 40-44 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_                      6) ☐ Other: \_\_\_\_\_

***Claim Rejections - 35 USC § 103***

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1-20 and 42-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krall (newly cited) in view of Chorbadjiev et al (newly cited, previously of record), the admitted prior art (newly cited), and either one of Loctite 410 or Loctite 416.

Krall taught that it was known at the time the invention was made in the art of manufacturing electronic microchips to utilize methyl cyanoacrylate or other cyanoacrylates as an adhesive for joining contact leads to chips. Since the major failure mode of chips occurs at the chip lead interface, it would have been advantageous if such cyanoacrylate adhesives were radiopaque so that the weld could be examined, see column 1, lines 42-53. clearly, it was known at the time the invention was made to utilize a cyanoacrylate adhesive to join the contact leads of a leadframe to a chip. The reference failed to make mention of the speed with which the cyanoacrylate adhesive cured in the operation.

In the art of manufacturing electronic components (such as the attachment of a chip to leads), the reference to Chorbadjiev et al (the article entitled "The effect of fillers upon properties of electroconductive cyanoacrylate adhesives" from the International Journal of Adhesion and Adhesives, July 1988) suggested that cyanoacrylate adhesives when compared to traditional epoxy adhesives had the following strong points: (1) short setting time at room temperature; (2) one component adhesives; (3) strong bonding action; (4) easy to work with, and; (5) satisfactory electroconductivity of adhesive bonds. It should be noted that the reference to Chorbadjiev et al is concerned with the manufacture of an electroconductive adhesive material (which is was one

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would have utilized to join the chip to the leads in Krall. The reference clearly suggested that the curing times would have been short with cyanoacrylate and additionally provided additional reasoning as to why those skilled in the art at the time the invention was made would have selected cyanoacrylate adhesives for the bonding of the chip to the lead of the leadframe. The reference, nonetheless, did not expressly state that the material would have cured in less than one minute at room temperature (20-30 degrees C) to between 90-100% crosslink density (polymerization).

However, the applicant has repeatedly admitted that such is intrinsically a property of cyanoacrylate adhesives (see page 11, of the response dated 9-12-2001 in child patented file Serial Number 09/274,128, for example):

“In this regard, Applicant would submit that although cyanoacrylate adhesives and anaerobic adhesives, which are formulated to cure in less than sixty seconds, are known in the art, they have not heretofore been used to construct a semiconductor package as presently claimed.”

Clearly, the quick curing of the adhesive was known per se in the art. Additionally, as evidenced by Loctite 410 and Loctite 416, commercially available quick curing cyanoacrylate adhesives existed which cured within 60 seconds at room temperature to complete cure (100% polymerization. The applicant is referred to the spec sheets of Loctite 410 and Loctite 416 for the specific curing properties achieved with the use of the same. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a cyanoacrylate adhesive to join leads of a leadframe to a semiconductor chip as such was suggested by Krall wherein the cyanoacrylate adhesive would have been known to have incorporated an electrically conductive filler therein in order to facilitate electrical conductivity whereby such an adhesive had a quick cure time as evidenced by Chorbadjiev et al and wherein the adhesive was known to have had a

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cure time within less than one minute at room temperature as suggested by the applicant's admitted prior art and either one of Loctite 410 or Loctite 416.

With regard to the various dependent claims, the applicant is advised that the admitted prior art suggested that chip on lead assembly was known per se as well as wire bonding and encapsulating the same. the applicant's disclosed contribution (and the application has been argued as such) to the art was the recognition that cyanoacrylate adhesives would have been useful for joining leads to a chip in the semiconductor art and that no reference suggested the same. The newly cited reference to Krall suggested the use of cyanoacrylate adhesives to join a chip to leads of a leadframe. The particular configuration of the semiconductor assembly would have been selected dependent upon the desired demands of the customer and are within the skill level of the ordinary artisan to select (the various chip arrangements and lead arrangements are taken as conventional in the art). The applicant is additionally advised that one skilled in the art would have known to incorporate a filler such as an electrically conductive filler in the resin as suggested by Chorbadjiev et al.

3. Claims 21, 22, 40, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent 58-196,280 (newly cited) in view of the admitted prior art.

Japanese Patent '280 suggested that it was known to utilize an anaerobic adhesive to join a chip to leads of a board in the manufacture of a semiconductor assembly wherein the anaerobic adhesive material was an acrylic anaerobic adhesive material. the reference failed to make mention of the specific cure times of the anaerobic adhesive material, however it did suggest that the cure times would have been fast. Additionally, the abstract suggested that the adhesive would have included filler therein in order to render the adhesive material electrically conductive.

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The admitted prior art as discussed above in paragraph 2 suggested that those skilled in the art would have known that anaerobic acrylic adhesive would have cured in less than 60 seconds at room temperature (see page 11, of the response dated 9-12-2001 in child patented file Serial Number 09/274,128, for example):

“In this regard, Applicant would submit that although cyanoacrylate adhesives and anaerobic adhesives, which are formulated to cure in less than sixty seconds, are known in the art, they have not heretofore been used to construct a semiconductor package as presently claimed.”

Clearly, those skilled in the art of adhesives would have recognized that the cure time under room temperature conditions was an intrinsic property of the material (the available anaerobic acrylic adhesives would have cured within the times specified by applicant). Note that one would have had to have applied the adhesive to the material in some manner whether it was applied to the leadframe or the chip prior to contact would have been understood in order to develop a bond. Additionally, the various arrangements of chip on lead assemblies were admitted by applicant and are taken as conventional in the art at the time the invention was made. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a quick curing anaerobic acrylic adhesive to join leads to chip as suggested by Japanese Patent 58-196,280 wherein the adhesives were known to join chips in semiconductors in various configuration and wherein the anaerobic adhesives were known to have quick curing properties including setting within 60 seconds as suggested by the applicant's admitted prior art.

The particular filler selected for the adhesive would have been within the skill level of those in the art dependent upon the desired properties one wished to attain and thus those skilled in the art at the time the invention was made would have known to incorporate an electrically insulating filler when insulation was desired and an electrically conductive filler when such

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electrical properties were desired. The particular fillers are taken as conventional in the art. Additionally, the use of wire bonding and encapsulation is not only admitted by applicant but is likewise taken as conventional in semiconductor processing.

#### ***Response to Arguments***

4. Applicant's arguments with respect to claims 1-22 and 40-44 have been considered but are moot in view of the new ground(s) of rejection.

The applicant argues that none of the prior art of record recognized that one skilled in the art would have utilized a cyanoacrylate adhesive for joining a lead to a chip in semiconductor manufacture (and that the cyanoacrylates employed have existing for a long time and no one has utilized them for joining a chip to a lead of a leadframe). The applicant is advised that the newly cited reference to Krall suggested this arrangement. Additionally, the reference to Japanese Patent '280 suggested that those skilled in the art at the time the invention was made would have incorporated an anaerobic acrylic adhesive material for joining a chip to a lead in semiconductor manufacture. While neither reference expressly suggested the specific properties of the adhesive material (cures in less than 60 seconds at room temperature), the claimed properties were known to those skilled in the art at the time the invention was made as expressed by applicant's admitted prior art, for example.


#### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff H. Aftergut whose telephone number is 703-308-2069. The examiner can normally be reached on Monday-Friday 6:30-3:00pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael W. Ball can be reached on 703-308-2058. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

  
Jeff H. Aftergut  
Primary Examiner  
Art Unit 1733

JHA  
May 5, 2003